Exploring AI Ethics and Values through Participatory Design Fictions

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Abstract: Robots and AI agents seem poised to transform our personal lives and society. Because these entities represent forms of autonomous technology that can affect all of us profoundly, it is important to anticipate ethical issues, and to address them before, during, and after design. Popular culture conveys disparate visions of intelligent machines, reflecting the views of individual authors and, influentially, major entertainment production companies. Academic experts call for more work by academic experts. By contrast, in this paper, we propose ways to restore the future users to a central position in anticipating, designing, and evaluating future intelligent machines. We re-use concepts from the recent trends in Design Fictions, but we re-engineer those methods to reflect the interests and the values of the future users. Informed by principles from Participatory Design and Value Sensitive Design, we describe four potential methods through which we can work in the present with future users to explore polyvocal value spaces, and to design the ethics and values of intelligent entities, and we report initial results from proof-of-concept explorations of two of these methods.

Keywords:

- Design fictions
- Participatory design
- Value sensitive design
- AI agents
- Robots

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There are three worlds of artificial intelligence (AI). In popular culture's **first world of AI**, intelligent agents appear in fictions, movies and video games as embodied intelligences (*Frankenstein*, *RUR*, *Terminator*, *I Robot, Humans*), disembodied intelligences (*Colossus*, *HAL*, *The Ship Who Sang*), as well as hybrids of cybernetics and biology (*Ancillary Justice, Continuum, Farscape,* the Borg of *Star Trek: The Next Generation*). Often, these entities are presented as having unbounded capabilities and sometimes complicated relations with humans.

In computer scientists' **second world of AI**, agents are computational programs that autonomously optimize to achieve given goals through intelligent functions. Because the autonomous optimization may develop rapidly and potentially unpredictably, we are confronted with the challenge of *value alignment*---to assure that the goals and behaviors of AI systems to align with human values (Wallach and Allen; 2008; Russell et al., 2015). But one may start asking: *What values*? *Whose values*? In many cases, computer scientists and engineers have strongly held beliefs about the ethics and values of the AI technologies, which may be based more on their own backgrounds than on a broader or societal understanding (Cheon and Su, 2016; Fitzpatrick, 2015; Richardson, 2015). Their discipline may also urge them toward solutions before a complex or "wicked" problem space has been adequately explored (Blythe et al., 2016). Experts tend to ask for advice or collaboration from other experts (Berkman Klein Center, 2017). The users "come to occupy a secondary role… as objects of study rather than as active subjects and participants" (Šabanović, 2010).

In our work as HCI researchers and designers of intelligent agents, we often struggle with connecting the two worlds. Furthermore, the crafting of these futuristic concepts in popular culture reflects the views of privileged authors, or even more privileged media production companies. The crafting of computer technologies also reflects the views of privileged professionals, namely ourselves. The future *users* of these technologies will inhabit a **third world of AI**, in which ordinary people must deal with AI entities that are produced by other people, and inevitably reflect the interests of those other people. How can users begin to write their own accounts of technologies they envision, and values that are implicated by those future technologies?

Part of the struggle comes from understanding users in a design space that they may not have lived in, but have experienced through popular culture products. User needs, and ultimately, user values, in interacting with AI products are inevitably shaped by such experiences, but are often too ambiguous for system development to operationalize on. For example, while many adore a sociable and cheery robot like *Star Wars*' C-3PO, after decades of AI and HCI research we still struggle to understand what behavioral designs in conversations and body movements constitute agent personality in users' perception (Cassell et al., 2000), and further, how to orchestrate them computationally. Sometimes the design space seems so alien that users simply cannot relate or articulate in the abstract, calling for "formative research methods of the future" that go beyond observing, inquiring and assessing, to immersing, speculating and provoking. While it is of course possible to ask people about robots via a survey or questionnaire (e.g., Woods et al., 2004), those methods typically allow us to ask only about what we already know or suspect. For this unknown future, we need methods that are more likely to tell us about what we don't already know.

Design Fictions and Speculative Futures

Design Fictions. We propose to address these uncertainties through methods derived from recent work in Design Fictions. Design fictions are complex and varied, taking many forms for many purposes (Kjaersgaard and Boer, 2015; Knutz et al., 2014). Dunne and Raby propose design fictions as critiques of present-tense situations, including capitalism. We pursue instead a future orientation, as suggested by Sterling's "deliberate use of diegetic prototypes to suspend disbelief about change" (Sterling, 2012; see also Tanenbaum 2014). We introduce fictional narratives to explore a design space of AI products as a natural extension of the fictional world people have already been exposed to through popular culture. In particular, design fictions have been embraced for revealing values associated with new technologies (Brown et al., 2016; Dourish and Bell, 2014; Tanenbaum et al., 2016); for opening a space of diverse and polyvocal speculations about future technologies (Blythe, 2014); and engaging and inquiring about specifications of these values.

Participatory Design. Another part of our struggle is dealing with a lack of shared experience, which could serve as the basis for users to co-design AI agents (Bødker et al., 2009; Muller and Druin, 2012; Sanders and Westerlund, 2011). Beyond Siri-like command-based programs, advanced intelligent agents are still infrequently encountered for most people. Some AI products we work on are futuristic in nature—being developed with little current user base, such as humanoid robots (Cheon and Su, 2016, 2017). For these robots, identification of prototypical users and common behavioral patterns (e.g., by task analysis) is often challenging, if not impossible. Eventually, it will be possible to find prototypical or lead users (von Hippel, 2005) or early adopters who can help us understand what other users may want or need. However, because the futuristic technology does not yet exist, we need to do "fieldwork of the future" (Odom et al., 2012) to understand users' needs, ideas, and assessments of technologies and experiences that do not yet exist. Participatory Design (PD) methods often address questions of designs for the *immediate* future, based on imagined (i.e., fictive) scenarios of future use. We modify participatory approaches to deal with a more distant future.

Value Sensitive Design. The challenge becomes more complex when we consider that AI agents may also function as close-to-social entities (Liao et al, 2016), and our relationships with AI will hopefully become collaborators, even integrated partners (Licklider, 1960). To consider possible social factors is to "acknowledge the uncertain unfolding of history," and "allow more meaningful interrogation of the future" (Gonzatto, 2013; Lindley and Coulton, 2016). Autonomous technologies imply questions of values and ethics (Winner, 1978). When this autonomous technology is incorporated in *social* entities, interacting with us and also as a medium for us to interact with others, questions of values and ethics become even more urgent.

We propose to use the lens of Value Sensitive Design (VSD) (Friedman et al., 2006) to organize an analysis of the values issues that may engage our users, and also other indirect stakeholders in the design of future AI agents. Researchers in VSD have developed a "tripartite methodology," consisting of conceptual, empirical, and technical components. In their collegial critique of Participatory Design, Friedman et al. pointed out that most technologies and policies have implications for both the direct users (i.e., the workers, in PD) and a range of other parties who are also indirectly affected by them (Nathan et al., 2011). To unify the concepts, they refer to *direct stakeholders* and *indirect stakeholders*, including in some cases stakeholders who are not currently involved, but who may be involved in the future (Briggs and Thomas, 2015; Nathan et al., 2011). Adapting some of these approaches may help us to address our questions about the users of future technologies. We propose to build on some of the empirical innovations in VSD (e.g., Friedman and Hendry, 2012; Nathan et al., 2008; Woelfer et al., 2011; Yoo et al., 2013), leading toward a set of practices within the VSD framework that might be called Value Sensitive Inquiry.

Design Fictions to Explore Values implicated by AI Agents

How can we support users to speculate on future technologies? How can we analyze and interpret their accounts of the technologies? We think of *fictive experience space* (or a future co-design space, Sanders and Westerlund, 2011; Odom et al., 2012; Yoo et al., 2013), in which users may individually or collectively envision, design, and critique future AI agents. To start with, these spaces provide a *discursive story world* for participants (future users) to experiment with near-future technologies or situations *in a structured way*. Crucially, we want to use fictions as an accessible vehicle through which the users may not only experience *our* future design concepts, but also *articulate their own views* of the future of AI. Different people's views may differ radically from one another. Because fictions can be written individually or collaboratively, we intend to use fictions as a means toward polyvocal concepts of the future(s) of these technologies (for related polyvocal work in art, see Myre, 2013).

We know that people often configure or redefine technologies through use (Carroll, 2004); design fictions would allow people to engage imaginatively in activities of "future-configuring" while in the present. While "discursive" emphasizes creativity and novelty, "structure" enforces boundaries of the fictional experience that may help reduce risks of designing with speculations. A fictive experience space can enable fictions in many forms for value sensitive inquiry with AI agents.

Fictions as Probes. Earlier work in PD has used stories to elicit future users' evaluation. Salvador and Sato (1999) used dramatically enacted stories as probes in focus groups. Less formally, Muller et al. (1994) and Gruen (2000) described stories as means for eliciting users' needs. In these ways, we could present completed design fictions as starting points for a conversation (Cheon and Su, 2017; Draper and Sorell, 2014; Kymäläinen et al., 2017; Schulte et al., 2016). Questions addressed to users could focus on values that they perceive in the stories, or other aspects of user experience and/or technology that were important to the design team.

Fictions as Conceptual or Literal Guerrilla Theatre. But why should users only *react* to a story (Cheon and Su, 2017), or to a list of values (Friedman and Hendry, 2012)? Why shouldn't they *change* the story as part of their critique? Boal's *Theatre of the Oppressed* employed stories (enacted scenarios as brief dramas, portrayed in the street) as a critique of power (1974/1992). Surprised passers-by were encouraged to rewrite the story – or to participate in its changed enactment - so that it would have an outcome that they preferred. Muller et al. derived *Interface* Theatre as a means to critique and change a proposed user experience (1994). For work with fictive agents, we would adapt Boal's practice into two forms. (a) Similar to *Theatre of the Oppressed*, including characters and plot devices about robots; (b) Stories in text form, in which we ask people to rewrite the characters, plots, and/or the outcomes.

Fictions as Participatory Constructions. A more ambitious approach could solicit stories to be written by users. Beeson and Miskelly (2000) advocate user-created stories through hypermedia technologies such that "plurality, dissent, and moral space can be preserved." Törpel and Poschen (2002) described a related method of *Narrative Transformation*, emphasizing workers' roles as story-creators, story-analysts, and originators of new concepts. Druin engages children to construct their own narratives in a playful technology environment (2002). Prost et al. described a structured, participatory workshop process to teach students to create design fictions for sustainability (2015). If we can also engage users in creating their own stories, then we can pose values-oriented questions as starting points for those stories.

Fictions as Group Co-Creations. Robots and agents may interact with groups, as well as individuals (Porcheron, 2017). We may need ways for groups to speculate about these future technologies. In PD, photodocumentaries have been co-created by communities. To address the problem that "rural women are often neither seen nor

heard," Wang et al. (1996) in collaboration with the Yunnan Women's Health and Development Program, invited Chinese village women to articulate their lives through photo novellas created with cameras that the women controlled, with the goal of influencing policy-makers. In an exploration of products for mobile knowledge workers, Dandavate, Steiner, and William (2000) similarly asked their informants to take pictures as part of a documentation of their lives. We could use similar approaches (including the text, photo and video-recording capabilities of smartphones) to facilitate group co-creation of values-oriented stories about AI entities, with the addition of photo- and video- editing tools, and/or virtual objects and space creation software (similar to those in SIMS games) for creating futuristic documentaries.

Results to Date

At the time of revising this extended abstract, we have conducted two proof-of-concept studies following ideas from "Fictions as Conceptual… Guerilla Theatre" (above). In each study, we provide a user with the beginning of a story about a human choice regarding a robot or robots. Each story involved two contrasting sets of values, based on the needs of different stakeholders. We asked our informants to write the end of each story, and to explain their rationale (and values) in choosing the end that they created. Informants engaged in the stories, and readily completed the narratives according to their own values. As we expected, different informants preferred different endings, reflecting different sets of values. To our surprise, more than one informant questioned our binary conceptualization of two opposing sets of values, and creatively led themselves and us to new value configurations with new implications for human decisions and the design of their robots. We attach one of the stories in the Appendix.

We will report these preliminary results in greater detail at HCIC. By the time of the meeting, we hope also to have completed at least one group exercise using a "participatory construction" approach (see above).

Activities at HCIC

If there is time during our presentation, we hope to engage the HCIC audience with one or two of these methods. Perhaps we will collaboratively create new design methods.

Appendix: A sample unfinished story: The Apple Orchard

Disclaimer: This work is purely speculative, and should not be interpreted as implicit or explicit product plans for products or services from IBM.

The large apple orchard had been in Jesse's family for three generations. With aging parents in a nearby assisted living residence, now it was Jesse's turn to try to continue the family business -- necessary to pay tuition for Jesse's two children at college, and to save for medical expenses for those parents.

However, there were new challenges. Jesse was having trouble finding apple-pickers, and the new national pressures on undocumented workers seemed to be driving people away from Jesse's land, which was clearly visible from nearby roads.

Some other apple-growers had begun to replace human workers with robotic apple-pickers. They said that they could run the machines day and night, and that they could sometimes pick 10,000 apples per hour.

But Jesse enjoyed interacting with the apple-pickers, and liked having their kids around. Sometimes Jesse would get treats for the children, and tried to show up for birthday parties. Jesse was also concerned about what would happen to the school district if there were fewer children, as well as the consequences on the nearby outlets. A massive switch to robots could damage the community.

You finish the story --

1. What does Jesse do, and what are the consequences? Who would be affected by Jesse's decision?

2. What values might be important to each person or group that would be affected? If the values are different, how should Jesse resolve those values contrasts?

3. Whose voice(s) should be heard in making these decisions? Jesse owns the orchard, and depends on income from the apple harvest. Apple-pickers work on Jesse's land. Jesse's community needs children for its schools, and laborers to buy its food. Jesse's parents need to age gracefully if possible.

4. What would *you* do? How would you decide?

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